

tarsi, and spots on connexivum IV, blackish. Fore tarsi absent. Paramere of type in subgenus *Lophoscutus*.

**Measurements:** first figure in ratios represents the length and the second the width of measured part, 25 units equal to 1 mm. Head: ♂—29:17.5, ♀—30:18; relative length of antennal segments, I to IV, are: ♂—9(5):5(3.5):6(3):14(6), ♀—8(4.5):4(3.5):5.5(3):10(5.5), figures in parentheses represent maximum width of segment; pronotum: ♂—35:52 (maximum width across fore lobe 25), ♀—34:52.5 (maximum width across fore lobe 29); scutellum: ♂—73:40, ♀—73:40; abdomen: ♂—75:68, ♀—71:72 (maximum width in both sexes is across segment III).

Total length: ♂—5.52, ♀—5.40 mm.; width of pronotum: ♂—2.08, ♀—2.10 mm.; width of abdomen: ♂—2.72, ♀—2.88 mm.

**Holotype:** ♂, MEXICO, Guerrero, 6 mi W of Iguala—P. M. & P. K. Wagner collectors, 10.VII.1966; USNM 69955.

**Allotype:** ♀, MEXICO, Guerrero, 12 mi S of Chilpancingo, same collectors, 12.VII.1966; in the U. S. National Museum collection.

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## NOTES ON THE SYSTEMATICS AND MORPHOLOGY OF THE LACEBUG SUBFAMILY CANTACADERINAE (HEMIPTERA: TINGIDAE)

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Deposition of the Carl J. Drake collection of Hemiptera-Heteroptera in the U. S. National Museum, especially the remarkably complete accumulation of known taxa of lace bugs, provided a unique opportunity to prepare a needed key to the tingid genera of the world. Based on that collection, the recent Drake and Ruhoff (1965a) catalogue, and appreciated help from NSF grant GB-791, such a key is being constructed. The necessity for changes and additions to the information in that catalogue and the desire to keep the generic key in a certain format leads me to early publication of changes and descriptions of new taxa.

The subfamily Cantacaderinae appears to be a natural and valid group whose included genera fall into two categories characterized by Drake and Davis (1960:78) as the tribe Cantacaderini with a "stenocostal area" (the single outermost row of cells of the costal area

set off by a thickened vein) and the tribe Phatnomini lacking the stenocostal area.

My attempts to verify the correct tribal placement of the included genera revealed that the dorsal evidence of the stenocostal area was matched by a more complex development ventrally which could be present without evident dorsal expression.

The ventral development of the stenocostal area (fig. 1) consists of the outer row of cells being confined between two thickened veins which subbasally curve abruptly mesad and continue a parallel course with a narrow groove between them. The inner end of this groove disrupts the hypocostal lamina (uninterrupted in other Tingidae) and is directly in line with the peritreme extending from the scent gland opening. Such morphological alignment and possible functional interdependence imply a complex genetic control during the formative period. This ventral expression of the "stenocostal area" confirmed all tribal assignments of genera in the Drake and Ruhoff (1965a) catalogue except that of *Stenocader* Drake and Hambleton whose lack of dorsal expression of the stenocostal area led to its placement in the Phatnomini. The ventral modifications are, however, very strongly developed on *Stenocader* so it is here transferred to the tribe Cantacaderini.

***Cyclotynaspis* Montandon**

*Cyclotynaspis* Montandon, 1892:265.

***Cyclotynaspis acalyptoides* Montandon**

*Cyclotynaspis acalyptoides* Montandon, 1892:265.

This species was known only from the Singapore holotype for more than 70 years. Fortunately it recently was rediscovered by Dr. D. H. Murphy, University of Singapore, who found six adults and one nymph during his study of the forest litter fauna in Singapore. Study of this series confirms the Drake and Ruhoff placement of the genus in the tribe Phatnomini. The type and all adults studied were females.

***Gonycentrum* Bergroth, rev. gen.**

*Teleia* Fieber 1844:56. Preoccupied by *Teleia* Hübner, 1825, in *Lepidoptera*.

*Gonycentrum* Bergroth, 1898:9.

*Malala* Distant, 1910:101. **New synonymy.**

*Diagnosis:* This is the only genus of the tribe Phatnomini with the combination of the exposed scutellum and a long, slender, horizontal spine directed forward above each eye.

Type species: of *Teleia* Fieber, *T. coronata* Fieber, monobasic; of *Gonycentrum* Bergroth, *Teleia coronata* Fieber, objective synonymy; of *Malala* Distant, *M. bulliens* Distant, monobasic and original designation.

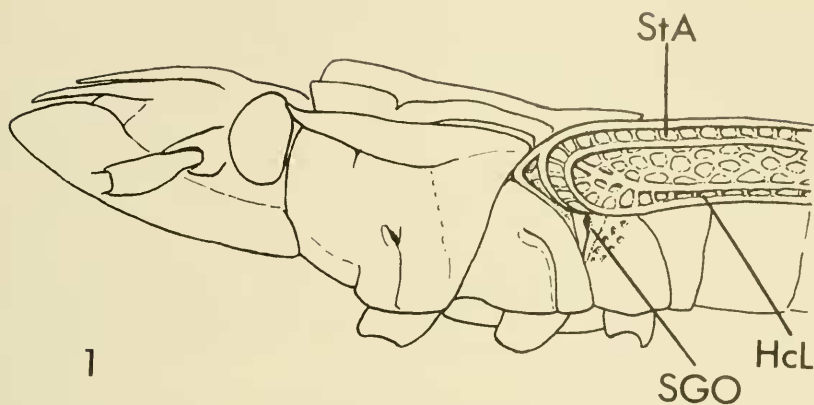


Fig. 1, *Cantacader quadricornis* (Le Peletier and Serville). Lateral view of head, thorax and bases of wing and abdomen. HcL = hypocostal lamina; SGO = scent gland opening; StA = stenocostal area.

*Comments:* In the Drake and Ruhoff (1965a) catalogue, *Gonycentrum* contained 12 species from three different zoogeographic subregions: Ethiopian, Oriental and Australian. During the search for characters with which to construct a key to the species, it soon became evident that certain head structures, which are generically important throughout the family, were associated with the species from each zoogeographic subregion suggesting that this was a composite genus.

The name *Gonycentrum* must follow the type species of the preoccupied name *Teleia* which it replaces. Thus the concept of *Gonycentrum* is returned to its original monobasic status containing one Oriental species.

For the other two groups of species formerly assigned to the inclusive use of *Gonycentrum*, the name *Sinalda* Distant can be resurrected from synonymy for the species of southern Africa, and a new genus must be proposed for those from the Australian Region; for the latter I propose below the name *Carldrakeana*.

The genus *Malala* also becomes involved with *Gonycentrum* because both genera are based on the same species. Subsequent to their catalogue, Drake and Ruhoff (1965b) described *Malala charieis* from New Guinea. Unfortunately, this species cannot follow *Malala bulliens* Distant into *Gonycentrum* because it is generically distinct. In fact the lack of paired spines on the vertex combined with certain other structures prevents its assignment to any known genus. A new genus, *Distocader*, is proposed for it below.

To summarize all the generic changes necessitated by this redefini-

tion of *Gonycentrum*, a key to the pertinent genera is offered below and followed by the necessary generic discussions and descriptions:

1. Head with a prominent tubercle on median line between eyes ..... 2  
    Head without a tubercle on median line between eyes ..... 3
2. Head with 3 tubercles on vertex, a median one and one above each eye  
    (South Africa) ..... **Sinalda** Distant  
    Head with one tubercle on vertex, the median one, none above eyes (New  
    Guinea) ..... **Distocader**, n. gen.
3. Vertex with a long slender spine arising near base above each eye and  
    extending horizontally and anteriorly to or beyond anterior margin of  
    eye ("Ostindien," India, Ceylon) ..... **Gonycentrum** Fieber  
    Vertex without spines or tubercles above eyes (Australia, New Guinea)  
    ..... **Carldrakeana**, n. gen.

Considering the good figure of *Teleia coronata* given with the original description by Fieber and the proximity of the type localities of *coronata* and *Malala bulliens*, it is quite surprising that Distant and all subsequent workers failed to recognize that both names belong to the same species. The fact that both Fieber's and Distant's excellent illustrations show the uncovered scutellum and the long, supra-ocular spines on the vertex leaves no other conclusion but synonymy as this combination is known in no other tingid. Drake and Ruhoff's (1965b:244) placement of their species *charieis* in *Malala* appeared to result from the superficial similarity of their species to *bulliens*, but the head armature makes this untenable and forces the creation of a new genus for their species.

#### LIST OF SPECIES OF *Gonycentrum*

*coronata* (Fieber), 1844, p. 56—*Teleia*, [Bergroth, 1898, p. 9]. "Ostindien."  
 = *Malala bulliens* Distant, 1910, p. 101. **New synonymy.** Ceylon.

#### *Sinalda* Distant, rev. gen.

*Sinalda* Distant, 1904:426.

**Diagnosis:** Among those genera of the tribe Phatnomini bearing a spine or prominent tubercle on the midline of the vertex, *Sinalda* may be recognized by also having paired spines or tubercles on the vertex and no lobular or spinelike projections on the horizontal or slightly oblique (not recurved) paranota.

**Type of genus:** *Sinalda elegans* Distant, subsequently designated by Monte (1947:4).

*Sinalda* was made a synonym of *Gonycentrum* by Drake (1950:165). When the present study found *Gonycentrum* to contain three groups of species distinguishable on certain head structures coupled with geographic distribution, *Sinalda* was available as the generic name for the species of southern Africa (see above treatment of *Gonycentrum* for details).

Eight of the previously described species of lace bugs plus one new one belong to *Sinalda*.

***Sinalda haplotaxis*, n. sp.**

**Diagnosis:** Among the named macropterous forms within the genus, this species is distinguished by the costal area containing only a single row of subquadrate areolae (except in basal fifth) which are distinctly larger than the areolae of the subcostal area. It appears to be closest to *thomasi* (Drake) in which the costal area has two or three rows of areolae for full length.

**Characters:** Holotype male, length 2.3 mm.; macropterous. Head dorsally with 8 stout cephalic tubercles: one pair each on juga, above clypeus, and above eyes, plus a single tubercle each medially on the vertex and clypeus; bucculae low (less than half the height of an eye), uniseriate, slightly surpassing and in contact beyond apex of clypeus; labium reaching between hind coxae; antennal segment I little stouter and longer than II, segments III and IV missing.

Pronotum without inflated cysts, anterior margin weakly concave, slightly convex behind eye; disc with 3 longitudinal carinae plus vague, longitudinal caloused swelling above each humerus; paranota distinctly wider than tibial diameter, with 2 rows of areolae from humeri forward, outline constricted opposite calli; posterior margin transverse, nearly straight, exposing scutellum. Elytra nearly flat (most of left one missing, areas well defined by elevated prominent veins; costal and subcostal areas subdivided by two and four, respectively, elevated thickened crossveins; costal area narrow, with 1 regular row of subquadrate areolae (except in basal fifth) larger than areolae of subcostal area. Scent gland opening obscure, without elevated auricular peritreme. Sternal laminae straight, parallel on all three thoracic sterna. Abdomen somewhat longitudinally impressed mesoventrally near base.

Holotype male: Transvaal, December 30, 1956, A. L. Capener (USNM 69913, in Carl J. Drake collection).

The species name is derived from two Greek words meaning "single" and "row" and reflects the virtually wholly uniseriate costal area.

**LIST OF SPECIES OF *Sinalda***

*aethiops* (Distant) 1902, p. 238—*Phatnoma*. **New combination.** South Africa.  
*afra* (Drake and Ruhoff), 1961, p. 126—*Gonycentrum*. **New combination.** South Africa.

*angustata* (Drake), 1956, p. 15—*Gonycentrum*. **New combination.** Tanganyika.

*elegans* Distant, 1904, p. 428—*Sinalda*. **Restored combination.** South Africa.

*haplotaxis*, new species (see above). Transvaal.

*nebulosa* Distant 1904, p. 428—*Sinalda*. **Restored combination.** South Africa.

*reticulata* Distant, 1904, p. 427—*Sinalda*. **Restored combination.** South Africa.

*tectacea* (Distant), 1902, p. 238—*Phatnoma*. **New combination.** South Africa.

*thomasi* (Drake), 1956, p. 14—*Gonycentrum*. **New combination.** Kenya.

***Distocader*, n. gen.**

**Diagnosis:** Among those genera of the tribe Phatnomini bearing a cephalic spine or tubercle on the midline of the vertex, this one can be recognized by having no pairs of spines on the vertex and no lobular or spinelike projection on the margin of the oblique paranotum.

**Characters:** Head with 6 tubercles (a pair above base of clypeus, a pair of weak tubercles on juga, one each on midline of vertex and clypeus); eyes more

than half as wide as interocular space; bucculae reaching apex of clypeus, not incurved anteriorly; labium reaching between hind coxae; antennae (missing from only available specimen, character derived from original illustration of type species) with segment III about 5 times as long as I plus II.

Pronotum without inflated cysts; anterior margin weakly concave; disc tricarinate, median complete, percurrent, dorsal outline angularly emarginate above calli, lateral simple, reaching to calli; paranota obliquely elevated, biseriate except around humeri where uniseriate; posterior margin transverse, nearly straight, exposing scutellum. Elytra conjointly weakly convex; areas separated by thickened veins; vein between discoidal and subcostal area elevated, containing a row of subquadrate areolae; subcostal area quadriseriate, costal area weakly oblique, biseriate for nearly full length; hypocostal lamina uniseriate. Sternal laminae present, low, areolate on all thoracic sterna, diverging on metasternum. Peritreme elevated, transversely oval auricle. Abdomen convex basomedially.

Type of genus: *Malala charieis* Drake and Ruhoff, present designation.

*Geographic distribution*: The lone known specimen was from New Guinea.

*Comments*: In the absence of any outstanding feature to be signaled by the generic name, the Latin word *disto*, meaning "be separate" or "differ" is combined with "cader" which is commonly used as a suffix in generic names in this subfamily.

#### LIST OF SPECIES OF *Distocader*

*charieis* (Drake and Ruhoff), 1965:244—*Malala*. New combination. New Guinea.

#### *Carldrakeana*, n. gen.

*Diagnosis*: This genus may be recognized within the tribe by the combination of no interocular spines or tubercles, the narrow, straight, slightly oblique, areolate paranota, and the costa gradually widening from the base.

*Characters*: Head with 4 dorsal cephalic spines (a pair above base of clypeus, one on each jugum); eyes almost half as wide as interocular space; bucculae far surpassing apex of clypeus, anteriorly incurved and usually touching each other; labium reaching base of abdomen; antennal segment III 3 to 4 times as long as I plus II.

Pronotum without inflated cysts; anterior margin transverse, nearly straight; disc with 1 or 3 longitudinal carinae, median percurrent, lateral carinae, when present, percurrent, interrupted above calli; paranota flat, somewhat oblique, narrow, with 1 or 2 rows of areolae; posterior margin weakly convex to truncate across middle third, exposing scutellum. Elytra conjointly convex; areas distinctly delimited by elevated veins; discoidal and subcostal areas usually interrupted by prominently elevated cross veins; costal area oblique, narrow, gradually widening from base, with 1 or 2 rows of areolae. Scent gland opening not visible, without elevated peritreme. Abdomen with midventral groove restricted to segments I and II, former with a spinelike prominence on each side of groove.

Type of genus: *Phatnoma tindalei* Hacker, present designation.

*Geographic distribution*: *Carldrakeana* occurs in Australia, Tasmania, New Guinea, and New Zealand.

*Comments:* This taxon is that part of the genus *Gonycentrum*, in the broad sense, characterized by the absence of spines or tubercles between the eyes. For further discussion of this genus, see the comments under *Gonycentrum*.

As is evident, the name proposed for this genus is a dedication to the late Dr. Carl John Drake who, in a half century of studying lacebugs, contributed many important papers and crowned his activities on the group with coauthored elucidations on their morphology and phylogeny (Drake and Davis 1960) and a world catalogue (Drake and Ruhoff 1965a) of the taxa involved.

*Carldrakeana* was misidentified as *Cyperobia* by Drake and Davis (1960:29, fig. 31) and Woodward (1961:155, figs. 18 and 19) who published illustrations of specimens under the name *Cyperobia caretorum*. The lack of an inflated "vesicle" or cyst anteriorly on the pronotum, which was very clearly characterized in Bergroth's original description of *Cyperobia*, prevents considering these figures as representatives of that genus. In fact, Drake and Davis' sketch and Woodward's figure 19 both show *Carldrakeana scoia*, a conclusion which in part is confirmed by examination of two of Woodward's Stokes Valley specimens now at hand. Woodward's figure 18 clearly runs to *Carldrakeana* but presents a combination of characters unlike that found in any of the three species known within the genus.

#### LIST OF SPECIES OF *Carldrakeana*

*engista* (Drake and Ruhoff), 1961:127—*Gonycentrum*. **New combination.** New Guinea.

*scoia* (Drake and Ruhoff), 1961:128—*Gonycentrum*. **New combination.** Tasmania.

*tindalei* (Hacker), 1928:177—*Phatnoma*. **New combination.** Australia.

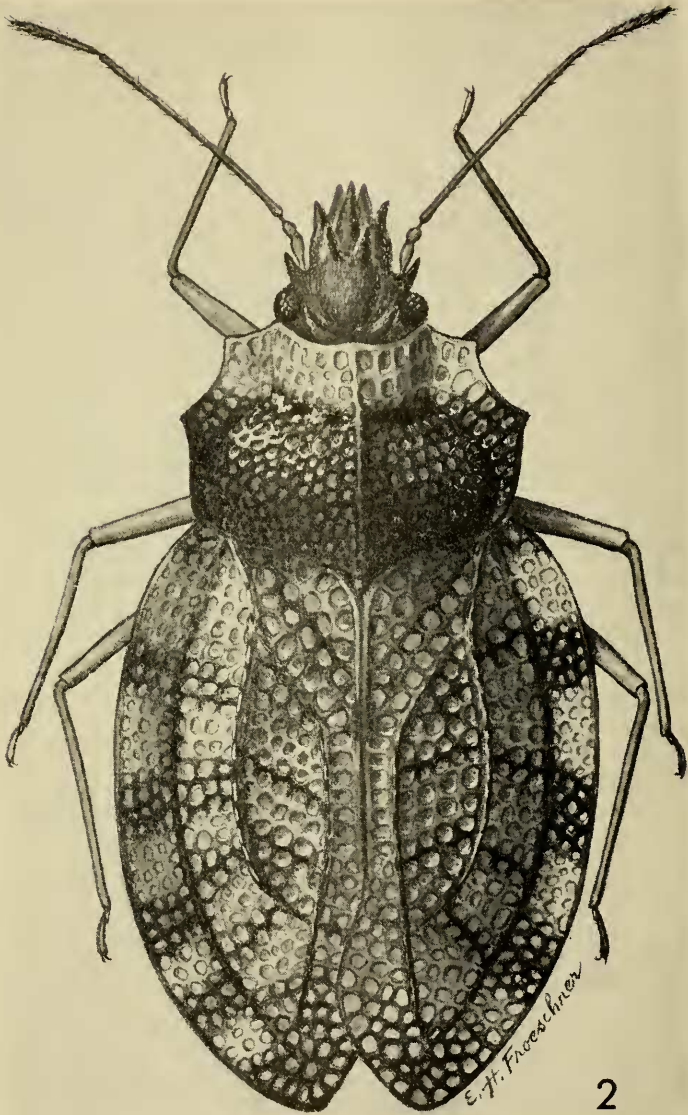
#### *Minitingis* Barber, rev. gen.

*Minitingis* Barber, 1954:7.

*Diagnosis:* Within the tribe Phatnomini, only this genus and *Gonycentrum* (in the restricted sense used above) possess seven spines on dorsum of head and a long labium reaching to second abdominal sternite. In *Gonycentrum* the spines above the eyes lie on the surface of the head and project horizontally and anteriorly to or beyond the anterior margin of the eye; in *Minitingis* these spines are much shorter and obliquely elevated.

Type of the genus: *Minitingis minusculus* Barber, monobasic.

*Comments:* Drake and Ruhoff (1960:28) synonymized *Minitingis* under *Zetekella*. Considering only the three species catalogued under that genus by Drake and Ruhoff (1965a) I tentatively accepted this synonymy. But the appearance of a second West Indies species agreeing with *minusculus* in the narrow form, head armature, long labium, paranotal development, and grooved abdomen created a



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Fig. 2, *Minitingis elsae*, n. sp.

distinct morphological pattern of West Indies versus continental American species. This pattern appears to have true zoogeographical significance best represented at this time by generic recognition; so Barber's genus is here resurrected for these two species.

**Minitingis elsae**, n. sp.

(Fig. 2)

**Diagnosis:** The conspicuous black and white color pattern is distinctly unique within the subfamily. Structurally this new species can be separated from the only other member of the genus by the greater number or rows of areolae (4 in contrast to 2) in the costal area.

**Characters:** Holotype male. Length 2 mm.; brachypterous. Head with 7 dorsal spines (one pair each above eyes, above base of clypeus and on juga, plus 1 medially at midlength of clypeus); antennophores anterolaterally prolonged into prominent spines; bucculae slightly surpassing apex of clypeus; antennal segment II shortest, I slightly longer, III about 5 times as long as I plus II, IV slightly thickened, about one-third as long as III; labium reaching apex of abdominal sternite II.

Pronotum without inflated cysts; anterior margin concave; disc unicarinate, median carina percurrent, elevated, areolated, dorsal margin angularly incised between calli; discal surface including collar but not calli, densely, subcristately punctured; paranota developed full length, narrow, 3 areolae wide opposite calli, lateral margin with a weak angulation subapically and submedially; posterior margin transverse, weakly convex medially, exposing small scutellum. Elytra conjointly weakly convex; areas separated by thickened veins; vein between subcostal and discoidal areas laminately elevated and areolated almost to apex, vein separating discoidal and sutural areas similarly developed except basally between discoidal and claval regions where it becomes almost obsolete; discoidal and subcostal areas subdivided by thickened cross veins; costal and subcostal areas 4 areolae wide for full length; clavocorcal suture obliterated, claval commissure distinct, elevated. Scent gland opening surrounded by strongly developed auricular peritreme. Sternal laminae on all segments uniseriate, straight, nearly parallel. Abdomen strongly impressed along basal third of midline.

Head and body black; collar dorsally and laterally, apical third of paranota, sternal laminae, metapleura, including peritremes, ivory white; heleytron ivory white, marked with dark fuscous or black as follows: Narrow base and 3 or 4 quadrate areas in costal area; lines along subdividing cross veins and nearby veins of subcostal and discoidal areas; and veins of sutural areas. Antennae and legs brownish.

Holotype ♂. Jamaica, intercepted on air freight being carried into the United States on September 19, 1966 (USNM 69914).

This beautiful little lace bug is dedicated to my dear wife, Elsie Herbold Froeschner, for her years of understanding and cooperation in my entomological pursuits and her willingness to beautify and increase the usefulness of my papers with her skillfully executed illustrations.

LIST OF SPECIES OF **Minitingis**

*elsae*, new species (see above). Jamaica.

*minusculus* Barber, 1945:7—*Minitingis*. Restored combination. Bahamas Is.

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## ERRATUM

Vol. 70(2):163. Change first line under CONCLUSIONS to read "1. Our North American *Polyergus rufescens* should be considered as one . . ." [J. Wheeler, Male genitalia and the taxonomy of *Polyergus*].